



➤ **Converting CSV Files to RKXML Files**

A computer program converts, into a format suitable for processing on Earth, files of downlinked telemetric data pertaining to the operation of the Instrument Deployment Device (IDD), which is a robot arm on either of the Mars Explorer Rovers (MERs). The raw downlinked data files are in comma-separated-value (CSV) format. The present program converts the files into Rover Kinematics State Markup Language (RKXML), which is an Extensible Markup Language (XML) format that facilitates representation of operations of the IDD and enables analysis of the operations by means of the Rover Sequencing Validation Program (RSVP), which is used to build sequences of commanded operations for the MERs.

After conversion by means of the present program, the downlinked data can be processed by RSVP, enabling the MER downlink operations team to play back the actual IDD activity represented by the telemetric data against the planned IDD activity. Thus, the present program enhances the diagnosis of anomalies that manifest themselves as differences between actual and planned IDD activities.

This program was written by Ashitey Trebi-Ollennu and Robert Liebersbach of Caltech for NASA's Jet Propulsion Laboratory.

This software is available for commercial licensing. Please contact Karina Edmonds of the California Institute of Technology at (626) 395-2322. Refer to NPO-44682.

➤ **Service Management Database for DSN Equipment**

This data- and event-driven persistent storage system leverages the use of commercial software provided by Oracle for portability, ease of maintenance, scalability, and ease of integration with embedded, client-server, and multi-tiered applications. In this role, the Service Management Database (SMDB) is a key component of the overall end-to-end process involved in the scheduling, preparation, and configuration of the Deep Space Network (DSN) equipment needed to perform the various telecommunication services the DSN provides to its customers worldwide.

SMDB makes efficient use of triggers, stored procedures, queuing functions, e-mail capabilities, data management, and Java integration features provided by the Oracle relational database management system. SMDB uses a third normal form schema design that allows for simple data maintenance procedures and thin layers of integration with client applications. The software provides an integrated event logging system with ability to publish events to a JMS messaging system for synchronous and asynchronous delivery to subscribed applications. It provides a structured classification of events and application-level messages stored in database tables that are accessible by monitoring applications for real-time monitoring or for troubleshooting and analysis over historical archives.

SMDB maintains a relatively small footprint of online data to maximize performance and minimize MTTR (mean time to repair) in case of failure. It also integrates Java, PL/SQL, and C codes to implement workflow rules, data processing, and data transformation functions invoked by data change events and timer events. Generic timer functions are implemented that are capable of delivering any type of message to a registered timer event processing function. SMDB exposes a set of APIs (application programming interfaces) for the retrieval, insert, and update of various types of structured data.

SMDB replaces an old file-based system driven by labor-intensive processes. It prompts for missing input and warns users and operators when this occurs. SMDB automatically generates the products needed to configure ground equipment and takes care of distributing the products to the DSN local and remote sites. It maintains a manageable size by automatically moving older data to an archiving subsystem and allows for controlled online software updates to reflect new processing rules or additional processing functions.

This work was done by Silvino Zendejas, Tung Bui, Bach Bui, Shantanu Malhotra, Fannie Chen, Paul Wolgast, Christopher Allen, Ivy Luong, George Chang, and Syed Sadaqathulla of Caltech for NASA's Jet Propulsion Laboratory.

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